DYNAMICS IN SOLID MOLECULAR HYDROGEN BELOW 4 K

DAVID T. ANDERSON, *Department of Chemistry, University of Wyoming, Laramie, WY 82071-3838*.

Cryogenic solid molecular hydrogen is a unique condensed phase environment due to a variety of quantum mechanical effects such as large amplitude translational zero point motion of the individual H_2 molecules, the presence of ortho and para nuclear spin manifolds, and that in the solid phase the individual molecules retain good vibrational and rotational quantum numbers. Equally intriguing is that a variety of non-classical dynamics occur within the crystal at liquid helium temperatures. This talk will highlight some of these dynamics as elucidated from high-resolution FTIR spectroscopy of chemically doped parahydrogen crystals. Some examples of the types of phenomena that have been studied are: ortho-H_2 spin diffusion and cluster growth, nuclear spin relaxation of ortho-H_2 to para-H_2 catalyzed by the presence of a closed shell impurity molecule, and the loss of chemically reactive species introduced into the crystal via tunneling reactions with the surrounding H_2.